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ABSTRACT

This paper examines three aspects of the public library's circulation service: (1) a demand function for the service is estimated; (2) a long-run unit circulation cost curve is developed; and (3) using the economist's notion of "efficiency," a general model for the pricing of the circulation service is presented. The estimated demand function describes how differences in the socioeconomic and demographic characteristics of communities affect the per capita use of the circulation service. The average cost equation shows how operating costs vary with library size and indicates that economies of scale are present in the provision of this service, showing how variations in service quality influence unit cost. The pricing model presents an alternative method of funding library operations. Drawing a general distinction between adult (recreational) and pre-adult (educational) users, it is argued that recreational users should bear their full share of operating costs, while educational users should have their use subsidized. Data tables and diagrams are provided. (Author/JD)

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A REGRESSION STUDY OF DEMAND, COST AND PRICING PUBLIC LIBRARY CIRCULATION SERVICES

by

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INTRODUCTION

At the present time, approximately 7,600 public libraries operate in the United States. These non-profit public firms offer a wide array of services to markets of varying size, under conditions that are, to a significant degree, monopolistic. While the size range of public libraries is considerable, the vast majority of these firms must be considered "small" by any relevant criterion. For this class of libraries, the provision of the circulation (book loan) service appears to be the overwhelmingly dominant service being rendered. This paper centers its attention exclusively on the circulation service, exploring three of its economic aspects.

First, the demand for the book loan service is examined. This is done through the development of a cross-sectional demand function for the circulation service. This function combines the findings from library user research with the economist's notion of demand. What emerges is an equation which discloses how differences in the socio-economic and demographic make-up of communities are related to variations in community use of the circulation service.

Second, a single equation regression model is produced which seeks to describe the relationship between library size and the average (unit) cost of producing the circulation service. While several studies have examined this relationship--finding that economies of scale exist--the

methodology they employed is quite different than that utilized here (13, 20, 32). In addition to difference in basic technique, the present analysis is singularly unique in that it explicitly recognizes differences in the quality of the service being rendered between libraries.

The third area explored in this paper concerns the "free" provision of the circulation service. The two questions addressed in this section are: 1) Why is the circulation service provided free of direct user charges? 2) Is there any "efficient" alternative to the present method of financing this service?

THE DEMAND FOR LIBRARY CIRCULATION

When an economist speaks of a demand function, he is making reference to an "equation", either formal or informal, which describes a relationship between the quantity of some good or service being purchased, and a set of factors which influence this quantity. In the present context, interest centers on the use of the public library's book loan service. Studies of library patrons have clearly established that certain traits typically characterize the library user. Through the integration of economic theory and library user research, a statistical demand function for the circulation service can be developed.

The demand function which is produced here is cross-sectional. This means that the sample employed in the analysis consists of a number of public libraries where both the variable to be explained and those that are used to do the explaining are obtained from the same time period.

The demand equation regresses a set of explanatory (independent) variables on that factor (dependent) whose deviation between observations is to be explained.

While inter-community differences in ciruclation is what is to be explained, the equation, as developed here, utilizes circulation per capita, rather than aggregate circulation per annum.[1] The reason for this is essentially statistical. If total circulation is employed as the dependent variable, it would be discovered that virtually all of its variation between communities would be accounted for by differences in the size of the served populations. Since the purpose of this analysis is to assess the relative importance of a group of socio-economic and demographic traits on circulation, the equation is couched in per capita terms. This modification adjusts the observations to reflect inter-library differences in served populations, allowing attention to center on a set of "underlying" causal factors.

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[1]The analyses undertaken in this paper employ reported transactions, which are assumed to be identical to circulation.

In selecting the set of explanatory factors to be included in the estimating equation, the economist customarily includes certain traits because of the "laws" that govern rational behavior. Thus, the price of the good being studied, the income of consumers, the prices and availability of related goods, and expectational factors with regard to the good's future price and availability, would, to the extent possible, be included. In addition, particularly in cross-sectional studies, an accounting for differences in community "tastes" is necessary. These differences in tastes will, to a considerable extent, exist because of differences in the socio-economic make-up of communities.

Regarding these explanatory variables, price is generally considered to be a key factor in explaining variations in the quantity of the good or service demanded. Yet, the use of the book loan service is free; that is, there is no direct charge imposed on the borrowers of books for outside use. This seeming quandary can be reconciled, once it is recognized that the price of acquiring a good can be viewed in a more general sense. The true price of using the circulation service is the time, effort, and expense associated with a trip to the library. While data in this area is rather scant, it is possible to approximate the distance that the average community resident would have to travel to get

to the library. This distance estimate is used in the demand equation as the price of the circulation service. Following the economist's "law of demand", it is hypothesized that an inverse relationship will exist between distance and per capita circulation.[2]

A second explanatory factor embodied in the model is the average money income of consumers in the community. To avoid the influence of extreme values, census estimates for median family income are used, rather than mean values. User studies have found that there appears to be a direct relationship between income and library use, except for the highest income classes (2, 23). On the basis of this, one would anticipate a direct relationship would exist between income and per capital circulation.

A third factor included in the equation is population density. This variable is used as a surrogate for the availability of substitute recreational activities. It is reasoned that the more densely populated a community, the more convenient will be the location of substitutes for library use. It is hypothesized that population density and circulation will vary in opposite directions.

Fourth, a proxy variable is included to measure the probability of success associated with a trip to the library.[3]

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[2]William R. Monat, in a study of Pennsylvania libraries, found that distance was inversely related to use (25).

[3]The use of a probability of success variable has been employed to appraise the effect of variety on retail demand (3).

The library's total bookstock appears to be a valid measure of this, reasoning that the larger the bookstock, the greater the likelihood that a specific need could be met. It follows that the bookstock variable and per capita circulation should vary in the same direction.

In addition to the above four factors, two variables are included in the equation to establish the relationship between education and circulation use. These variables are the median education of adults in the community, and the percent of the community's population in school (elementary and high).[4] In conformance with user research, it is anticipated that a positive association will exist between both education variables and per capita circulation (7, 9, 30, 31, 33).

The final explanatory variable embodied in the equation seeks to assess the importance of the community's racial composition on circulation use. The variable used is the percent of the community's population which is black. While research in this area is somewhat scant, that which does exist, indicates that non-whites tend to use libraries to a lesser degree than whites (23, 30). On the basis of this, it is expected that this variable and per capita circulation will vary inversely.

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[4]An additional factor found to be a determinant of circulation use was the percent of the community's population who were housewives. Unfortunately, the simple correlation between this variable and the percent of the population in shool exceeded .90. For this reason, the housewives variable was excluded from the model.

In its general form, the regression model is

$$C = f(P, I, D, B, E, S, N, u),$$

where

C = per capita circulation,

P = average distance travelled,

I = median family income,

D = population density,

B = total bookstock,

E = median educational attainment of adults,

S = per capita school (elementary and high) enrolment,

N = percent of the population black,

u = the stochastic variable, which is meant to capture all other forces which can influence C.

While the equation is estimated using several theoretically functional forms, that which yields the best fit to the data is multiplicative (double-log). This means that the variables are estimated in their natural log form. Using the variable sybols from above, the multiplicative expression may be written as

$$C = AP^{b1}I^{b2}D^{b3}B^{b4}E^{b5}S^{b6}N^{b7},$$

or its equivalent,

$$\ln C = \ln A + b1(\ln P) + b2(\ln I) + b3(\ln D) + b4(\ln B) + b5(\ln E) + b6(\ln S) + b7(\ln N),$$

where the terms b1 through b7 are the coefficient estimated for the respective explanatory variables.

Table I, on page 9, presents the estimated coefficients for the model, their t-ratios, and their Beta weights (normalized regression coefficients).[5] The equation yields an R^2 of .59, indicating that this set of independent variables is capable of explaining 59 percent of the variation in per capita circulation between communities. An examination of the t-ratios discloses that four of the seven explanatory variables are significant at the five percent level. These include distance (price), the level of adult education, density, and the size of the library's bookstock. Of the remaining variables, all but the percent of the population black are statistically significant at ten percent.

The association of the independent variables to per capita circulation are, with the exception of the income variable, as anticipated. With respect to median income, it is likely that the direct relationship customarily found in patron studies is actually "caused" by other factors that tend to vary in the same direction as income.[6] One such factor would be education.

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[5]Beta weights are occasionally employed to assess the relative importance of the explanatory variables. Unlike the traditionally estimated coefficients, the Beta statistics indicate how many standard deviations the dependent variable will change, given a one standard deviation change in the independent variable.

[6]In an attempt to estimate the demand for library services in England and Wales, Ralph Young found the relationship between income and "issues" to be negative (35).

TABLE I

BOOK LOAN DEMAND FUNCTION (DOUBLE-LOG)

N=55

	Average Distance (Price)	Median Adult Education	P/C School Enrollment	Population Density#	Median Income#	P/C Black Population	Probability of Success#
Regression Coefficients	-1.408	4.057	.718	-.750	-.961	-.086	.859
t-ratios	3.38*	2.64*	1.78	4.15*	1.88	1.48	5.58*
Beta Weights	-.626	.485	.287	-.536	-.398	-.182	1.015

Constant=-7.09

R^2 = .590

F = 9.68

*Significant at 5 percent.

#Units in thousands.

While this circulation demand function does not completely explain inter-community variations in per capita use, it does account for approximately 60 percent. Further, the model provides some insight as to how changes in the socio-economic and demographic character of communities will affect circulation use. It can be expected that use will vary directly with the level of adult education, school enrollment, and library size; and vary inversely with distance (price), population density, and consumer income.

Having explored the demand for the circulation service, the following section examines the relationship between library size and the cost of producing the circulation service.

LIBRARY SIZE AND THE COST OF PRODUCING CIRCULATION OUTPUT

The population served by public libraries vary considerably with regard to their size. This, as one would anticipate, results in similar differences in their output of circulation. The present section examines the relationship between size and the relative cost of producing the circulation service. The purpose of this exploration is to determine whether "economies of scale" exist in the provision of this service, and if found, to determine the output range over which they exist.[7]

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[7]Economies of scale are said to exist when, after adjusting all resources to produce any output at the lowest possible cost, the average cost of production declines with increased output.

The association between size (output) and production cost will be established through the statistical estimation of a long-run average cost function for the circulation service. As in the preceding demand analysis, the model is cross-sectional, using a sample of Illinois public libraries. Since the purpose is to compare the costs of producing the circulation service for different size libraries, it is necessary that the cost employed in the analysis relate primarily to the production of this specific service.

Unfortunately, such a decomposition of costs cannot reasonably be undertaken for any large sample of libraries. This problem is largely, though not completely, circumvented by using a sample of libraries for which the circulation service appears to be overwhelmingly dominant in the range of services being rendered. An examination of the literature indicates that the importance of the circulation service, as a percent of all services offered, tends to decline as the size of the unit being examined increases (28). Employing this reasoning, the sample used in this analysis is restricted to libraries serving populations of under 50,000. It is felt that for this size group, the assumption that all operating costs are incurred in the production of the circulation service is not excessively unrealistic.

In addition to this problem of properly assigning costs, a further complication arises in dealing with a cross-sectional sample of service producing firms. This is the observable fact that the quality of the service is likely to vary between

producers. Where differences in the quality of the service exist, it is necessary to account for these so that the cost function describes the way costs vary with the output levels of some "standardized" service (17). It is not particularly revealing to know that the average cost of producing some service is less for a large producer than for a smaller firm if the quality of the large producer's service is known to be lower than that of its smaller counterpart.

The present analysis employs several variables in the equation to account for variations in the quality of the circulation service between libraries. In addition a variable is included to account for differences in community wage scales.

The dependent variable in this equation is the average cost of producing the circulation service. To obtain this figure for each of the observations, the library's annual operating cost is divided by its total circulation for the year. The operating cost used in this variable is generated by subtracting "transfers to the capital fund" from total annual expenditures.

The principal independent variable is annual circulation, which is used as the measure of library size. Both first and second power terms of this variable appear in the equation. This will cause the average cost curve to be non-linear when measured with respect to circulation output.

The remaining independent variables, as noted previously, serve to adjust average cost for differences in service quality or community wage scales. The five variables used for this

purpose are entered linearly in the equation and include: 1) hours open per week--a measure of differing availability; 2) the average staff wage--assumed to be a function of community pay standards; 3) the per capita staff--a measure of service quality; 4) the library's bookstock--a measure of physical size; and 5) books added in the past year as a percent of total books--a measure of bookstock quality.

In its final form, the regression model is

$$Y = A + b1(C) + b2(C^2) + b3(H) + b4(W) + b5(S) + b6(B) + b7(N),$$

where

Y = the average cost of circulation,
C = annual circulation,
H = hours open per week,
W = the average staff wage,
S = the per capital staff,
B = the library's bookstock
N = new books as a percent of total books.

Table II, on page 14, presents the estimated coefficients for the explanatory variables, along with their t-ratios, and normalized regression coefficients. The equation explains approximately 35 percent of the variation in average cost. While this R^2 value might appear low, it is not unexpected. While several factors might account for this poor fit, such as the use of an incorrect functional form, the ommission of relevant variable, or pure noise; one important factor concerns

TABLE II

LONG-RUN UNIT COST FUNCTION

N=438

	Circulation$	Circulation^2	Hours Open	Average Wage#	P/C Staff	Bookstock#	New Books/ Bookstock
Regression Coefficients	-7.900	9.921	.011	.013	105.335	.010	2.603
t-ratios	9.318*	5.651*	8.297*	3.520*	1.990*	6.783*	8.234*
Beta Weights	-1.856	.756	.629	.154	.079	.682	.354

Constant = .095

R^2 = .349

F = 32.931*

*Significant at 5 percent
#Units in thousands
$Units in millions

the underlying definition of a long-run average cost curve. This curve describes the lowest possible unit costs for producing different levels of output. It assumes that for any level of output, the firm is of "optimal" size, and produces its output in the most efficient--least cost--manner. It is likely that this condition is not met in the production of library circulation. For this reason, the cost curve which is developed should be viewed in a "quasi" sense.

An examination of the t-statistics discloses that all of the variables are statistically significant at the five percent level. Moreover, each of the adjustment variables is positively related to average cost. This is as one should expect. For instance, the positive association between hours open and average cost means that--given the values of the other variables--a library that maintains longer hours will incur higher unit costs.

Turning to the circulation terms, the alternating signs indicate that the curve will be parabolic. The fact that the squared term is the positive term denotes that the average cost curve will be U-shaped. Partially differentiating the average cost function with respect to circulation discloses that the minimum of the average cost curve coincides with a circulation rate of approximately 398,000. This indicates that there are, in fact, economies of scale in the production of the circulation service. These economies, however, do not persist over the entire range of library sizes, but are exhausted at a relatively modest rate of output.

Since it is more traditional for library professionals to establish a library's size by its served population, circulation in the present study is converted to a served population equivalent via a simple linear transformation--the regression of circulation on the population served for libraries in the sample. The resulting equation is

Population served = 2354 + .113 (Circulation).

According to this equation, the circulation rate of 398,000 corresponds to a library serving a population of approximately 47,000 residents.

Several studies, in addition to the present one, have examined the relationship between library size and the average cost of producing the circulation service. Two such studies were undertaken by John K. Hidzik, who examined public libraries in Michigan, and Richard L. Pfister and Jerome W. Milliman, who studied libraries in Indiana (20, 32). In both instances, the authors discovered the existence of economies of scale in the production of circulation. However, in both, these economies were found to be exhausted for libraries serving populations of no more than 25,000.[8]

Thus far, this paper has empirically examined the demand and cost functions for public libraries. In both instances, attention centered on "what is", which under certain restrictive

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[8] Pfister and Milliman, using six size classes, found unit costs to be minimized for libraries serving populations of from 10,000 to 17,999 (32). Hudzik, using four size classes, found average circulation costs minimized for libraries serving populations in the range 10,000-24,999 (20).

assumptions can yield some guide as to what is likely to be in the future. The final section of this paper examines circulation from a wholly different viewpoint; appraising the present system of free provision of the circulation service and offering an "efficient" alternative.

PRICING THE BOOK LOAN SERVICE

The primary function of libraries, as customarily envisaged, is the lending of books for patron use. The prefix "public" is attached to those libraries which undertake this function without imposing direct charges on the users of this service (1). Rather than finance their operations through the sale of output, public libraries generally obtain their operating revenues through a tax levied on the residents of the library's district (geographical market).

There is nothing inherently unique about the supply side of the lending operation that calls for either governmental provision, or provision free of direct user charge. Hertz, Avis, and National, each provide a service that is in many respects quite similar to that of the book loan service, and auto rental is neither free, nor undertaken by governmental firms.

Libraries operate in the above manner, not because this mode of operation is necessarily "right", but because communities, either through direct referendum, or through the behavior of their elected representatives, have chosen this method of operation. The governmental firm that dispenses

the circulation service is essentially the result of a normative collective action.

While recognizing that which presently exists, it is possible to examine the provision of the circulation service from the standpoint of economic efficiency. This approach requires that the recipients of the benefits from this service be charged for their consumption.

To undertake this appraisal, circulation users will be classified into two categories: adults and pre-adults. Somewhat simplistically, it is assumed that the sole function of adult use of the circulation service is to satisfy a recreational need. Pre-adults, on the other hand, are assumed to utilize this service exclusively to further their education.

On the basis of these assumptions, a reasonably sharp distinction can be drawn between these two classes of users. For adults, the recreational use of the service is akin to that of consuming any entertainment service. The benefits from this pastime accrue totally to the individuals who use this service. This characterizes what economists call a "private" good/service. In a market governed by consumer sovereignty, there exists no valid reason for subsidizing the recreational use of the circulation service. Users, under a strict market system, would be confronted with a positive price which would roughly approximate the average cost of producing the service.

Education, on the other hand, is considered to be a "semi-collective" good/service. This term denotes that the service provides benefits that accrue only in part to the direct

consumer. In terms of educational consumption, a portion of the benefits that emerge from the consumption of this service are secured by "society". The individual, through education, learns to read, to write, and to comprehend; which under a system of generally accepted standards of conduct, allows the individual to behave as a responsible member of society.

The consumption of an educational service is analogous to consuming an innoculation against some communicable disease. The consumer of the innoculation receives a direct benefit in that he will not contract the disease (private). In addition, those persons with whom this individual has contact will have no fear of acquiring the disease from the innoculated individual. They will also benefit from his innoculation (collective).

In determining the efficient quantity of the service to be provided, purely private demand (recreational) causes no major problem. For simplicity, the following analysis assumes that a single library provides the circulation service for a given market under conditions of constant average cost.[9] An examination of Diagram I, on page 20, discloses that the optimal output corresponds to Q, the output at which the downward sloping demand schedule intersects the marginal cost (=average cost) schedule. This intersection also establishes the price that should be charged for recreational (adult) borrowing.

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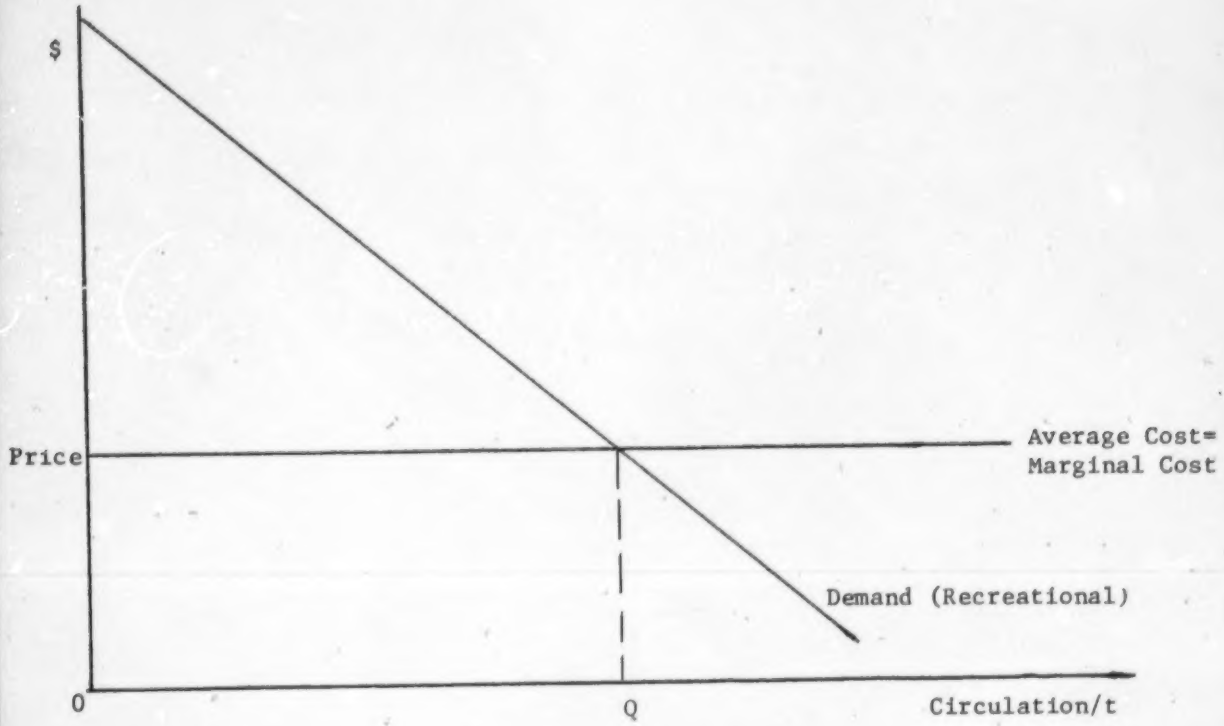
[9] If the average cost of production is constant, it will be equal to marginal cost--the cost of producing an additional unit of output.

DIAGRAM 1

SATISFYING THE RECREATIONAL DEMAND FOR LIBRARY CIRCULATION
(A PURE PRIVATE SERVICE)



To understand why this output is efficient, it is necessary to examine the underlying meanings of the demand schedule and the marginal cost schedule.

A demand curve may be viewed as a marginal evaluation schedule. Each point on the schedule denotes the value to society of that particular unit of consumption. The downward slope of the schedule indicates that the value placed on an additional unit of consumption declines as the volume of consumption increases.

Marginal cost, which in this example is assumed to be equal to average cost, measures (approximates) the value of the resources used to produce an additional unit of library output, in their best alternative use. Marginal cost is the "opportunity cost" to society of producing an extra unit of library circulation.

As long as the price that patrons are willing and able to pay for an additional unit of circulation exceeds its marginal cost, added resources should be devoted to its expansion. So long as demand price exceeds marginal cost, the value of this extra output exceeds the value of the output that these incremental resources could produce in some alternative use.

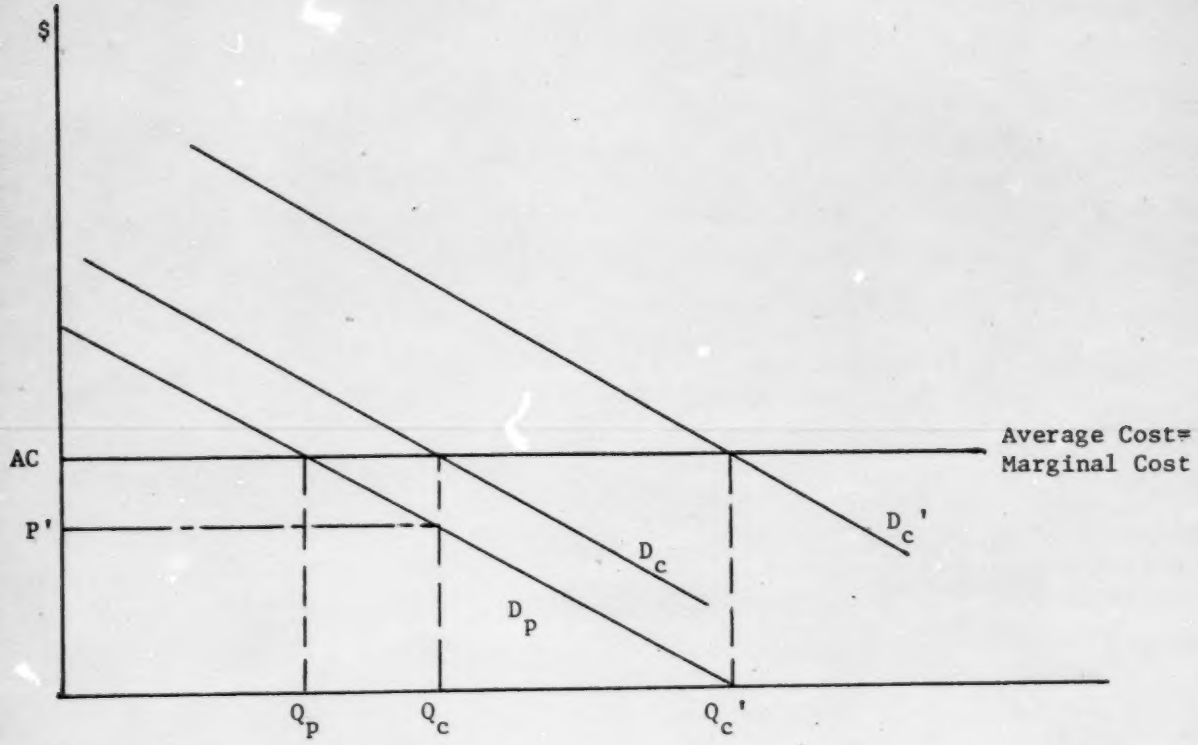
Determining the price and output for educational demand is, unfortunately, somewhat more complex. This is due to the fact that the consumption of circulation for this purpose yields both direct (private) and indirect (collective) benefits. The demand schedule for this educational use is comprised of two elements. First, there is that portion of demand which

constitutes the private component of this demand. This shows the quantity that pre-adults would voluntarily consume based solely on their evaluation of the benefits to them. This schedule is labeled D_p in Diagram 2, on page 23. Given the same average cost curve as in the preceding diagram,

the quantity that would be chosen by educational users would be Q_p. This quantity, from the standpoint of efficient provision, is too small, because it does not take into account the benefits that accrue to non-purchasers. To properly portray this semi-collective demand, the curve D_p should be shifted vertically to such a degree that it embodies those benefits that consumption yields to society. D_c might constitute such a schedule. According to this schedule, after accounting for all benefits, both private and collective, the quantity Q_c is the ideal level of output. A problem, however, exists. Since consumers are basically interested only in their own welfare, the maximum price that can be charged and generate this output level is P', which is below its average cost of production. This price would not allow the library to cover its full costs of operation. The solution to this dilemma is to subsidize the firm, using general tax revenues. The per unit subsidy would amount to the vertical distance AC - P'. A subsidy of this amount would allow the library firm to cover its full costs of production. The use of general tax revenues to supplement the library's income is efficient

DIAGRAM 2

SATISFYING THE EDUCATIONAL DEMAND FOR LIBRARY CIRCULATION
(A SEMI-COLLECTIVE SERVICE)



in the sense that this subsidy is acquiring collective benefits, which accrue broadly to members of the society.[10]

It should be noted, that in the preceding example, educational use of the circulation service is subsidized, but not free. The extent to which the educational use of the circulation service is subsidized depends on the magnitude of the collective element relative to the private element of demand. If the collective element is sufficiently large, it may be efficient to make the circulation service free to pre-adult users. This would be the case if in Diagram 2, curve D_c' portrayed the semi-collective demand for the service. In this instance, the maximum price that educational users would be willing to pay for the optimal quantity Q_c', is zero.

To this point, the pricing of recreational and educational circulation use has been undertaken separately. These demands are combined in Diagram 3, on page 25, where it is assumed that both are satisfied by a single community library.[11] Curve D_r represents the demand for recreational circulation. The horizontal distance between D_r and D_p is the private demand for educational circulation. D_p, in effect, corresponds to the total community demand determined by the generation of private

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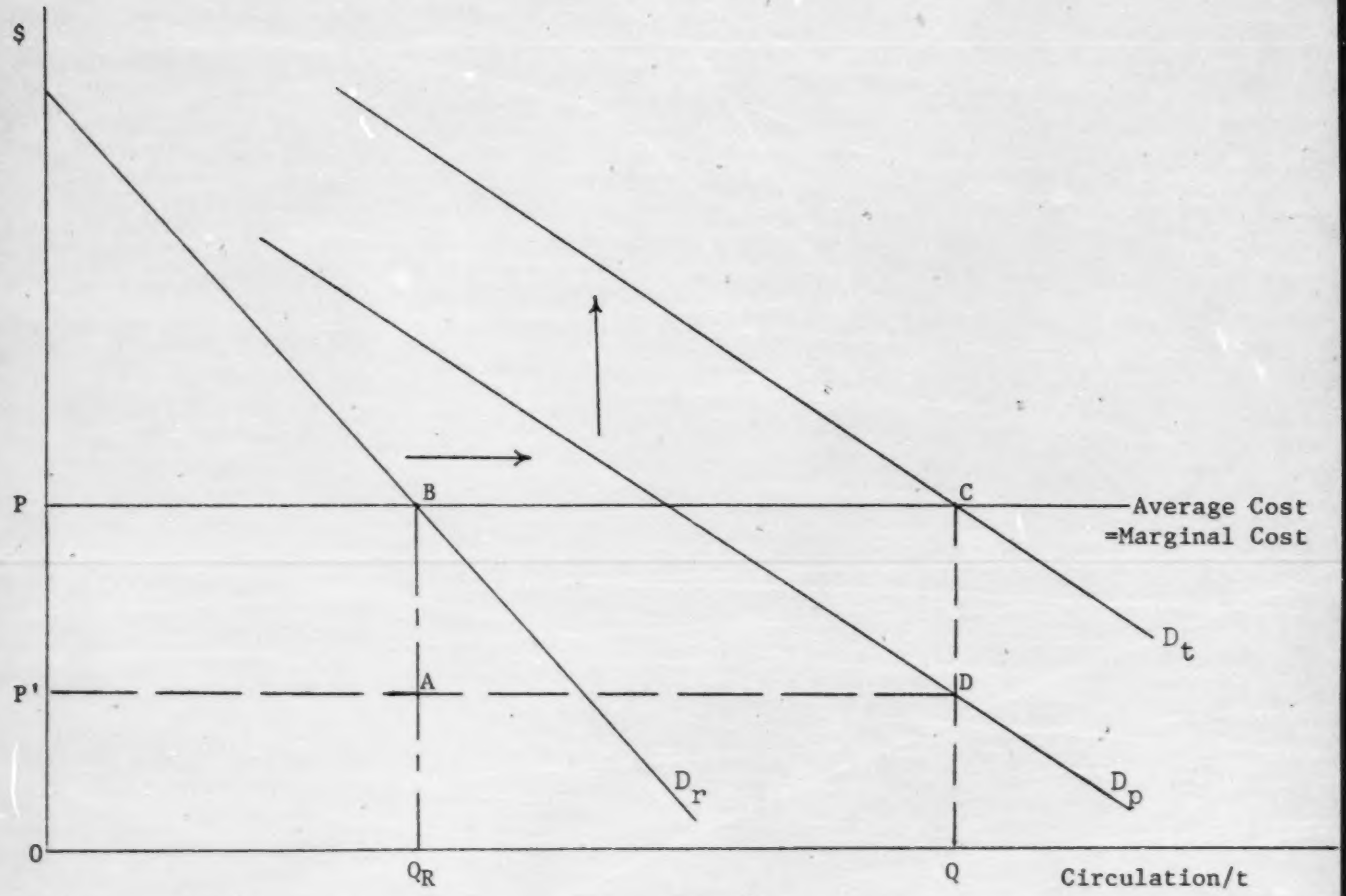
[10] If average cost declines over the entire range of output, as section three of this paper suggests, then the production of the efficient rate of output will require a subsidy in addition to that used to cover external benefits. Since this complication would not affect the general conclusions regarding the relationship between recreational and educational use pricing, it is purposely neglected.

[11] For simplicity, it is assumed that the production of recreational and educational circulation are completely independent.

DIAGRAM 3

THE OUTPUT AND PRICING OF LIBRARY CIRCULATION



benefits. Adding in the collective benefits that emanate from educational use raises D_p vertically to D_t, which is the aggregate community demand for the circulation service. Given the constant average cost, this results in an efficient rate of output equal to Q.

The total cost of providing the output Q is equal to the rectangle OPCQ. The financing of this output can be decomposed into three distinct components. Recreational users will be confronted with a price P = average cost = marginal cost. At this price, they will consume Q_r units of the service providing a revenue to the library equal to the rectangle $OPBQ_r$.

Educational use is measured by the horizontal distance Q_r to Q. As developed previously, this component of demand will be funded through both a user price and a subsidy. Based on the schedules portrayed in the diagram, the private component of educational demand, at the efficient output Q, denotes that the marginal private value of the educational component (Q_r to Q) is P' = Q to D. Based on this marginal valuation, educational users will be charged the price P' and contribute revenue to the library equal to the rectangle Q_r ADQ. Finally, the rectangle ABD represents the subsidy which the library receives to fund the provision of non-priced collective benefits.

A summing of the areas (revenues) contained in the three rectangles yields aggregate revenue just sufficient to cover the library's cost of operation.

The above illustrations indicate that an alternative to free provision of the circulation service exists. It shows, through a dichotomization of the market for library circulation that a theoretically efficient system for pricing the service may be developed. Additionally, the analysis discloses that use for educational purposes would always be priced lower than that for recreation, and may, at the extreme, be free.

The present system of free provision of the circulation service to all patrons has prompted several economists to consider public library production a "merit good". This simply means that society has chosen to provide this service at a price below that which would be charged on the basis of efficiency criteria.

SUMMARY

This paper explores three economic aspects of the public library's circulation service.

First, a cross-sectional demand equation is developed which seeks to determine how a set of socio-economic and demographic characteristics affect a community's use of the book loan service. It is found that per capita use varies inversely with the distance the average patron would have to travel to reach the library, the density of the community's population, and the median family income of the community. Conversely, a direct relationship is found to exist between per capita circulation and the median education of the community's adults,

the percent of its population in school, and the size of the library's bookstock.

Second, a quasi-long-run average cost curve is developed for the provision of the circulation service. Using a cross-sectional sample of Illinois public libraries serving populations of up to 50,000, it is established that economics of scale exist in the production of this service, though these economics are exhausted at a circulation output of approximately 398,000 volumes per year. This output level is associated with a library serving roughly 47,000 residents.

Finally, it is shown that a system for pricing the book loan service is theoretically diviseable, as an alternative to the present system of "free" public provision.

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